

FIG. 1 - 1

VAP-1 amino acid sequence (SEQ ID NO:1)

MAVLAVLLACLERAVAQTFGCSNTKINDQARKMIFYDAHNDARRSMAKGLE
PNKCGCLLSGGKNVYELNWDCEMEAKAQEWADGCPSSFQTFDPTWGQNYATYM
GS1ADPLPYASMAVINGWWSEIRTVGLTDPDNKYTNSAMFRANMANGKASAFG
CAYALCAGKLSINC1YNK1GYMTNAIIYEKGDACTSDAECTTYSQCKNGLCYK
APQAPVVEFTTMCPSPVTDQSDQARONFLDTHNKLRTSLAKGLEADGIAAAGAFAP
MAKQMPKLVKYSCCTVEANARTWAKGCLYQHSTSQAQRPGLGENLYMISINNMP
K1QTAEDSSKAWWSELKDFGVGSDNILTQAVFDRGVGHYTQMAWEGTTEIGCF
VENCPTFTYSVCQYGPAGNYMNQLIYTKGSPCTADADCPGTQTCVVAEALCV1P

vap-1 cDNA nucleotide sequence (SEQ ID NO:2)

ATGGCGGTATTAGCAGTGGTACTACTTACCGATGCCATTGGAGAGGGTTG
CACAGACGTTGGCTCTAACACCAAGATCAATGACCAAGCTCGTAAGAT
GTTCTATGATGCTCACAAATGATGCAAGACGAAGCATGGCTAAAGGGCTTGA
CCAACAAGGTGGGACTCTTATCTGGTGGAAAGAATGTTATGAATTGAAATT
GGGATTGCCAGATGGAAGCAAAAGCTCAGGAATGGCAGACGGATGTC
GCTCTTCCAGACATTGATCCAACATGGGGCAGAACTACCGCGACGTACAT
GGGATCGATGCTGATCCGCTCCATACGGCTTCCATGGCTTAATGGGTGGT
GGTCGGAAATTAGAACCGTAGGACTTACGGATCCCTGATAACAAGTACAA

To Fig. 1-2



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FIG. 1-2

FROM Fig. 1-1

CAGTGCATGTTCCGATTTGCTAATAATGGCAAATGGTAAAGCTTCAGCTTTG
GATGCGATACGGTTGGCCAGGAAACTATCCATCAATTGCATTACAA
CAAGATAGGATACATGACCAATGCTATCATTTATGAAAGGAGATGCCCTGT
ACCACTGACCGCTGAATGCCACCTACTCAGACTCACAATGCCAAACGGTC
TTTGCTATAAGCACCCTCAAGCTCCAGTCAGTGGACTTACAATGTGCCCT
TCGGTCACGGACCGTGGATCAGGGCGCTCAAAACTTCTGGACACCCATA
ACAATTGCGTACAAGCCTGGCAAGGGACTTGAAAGCTGATGGAATTGCCGC
TGGAGCAATTGCACCAATGCCAAGCAAATGCCAAACTGGTAAAATACAGC
TGCACAGTTGAAGCAAACGCCAGAACATGGCAAAGGATGCCATTACAGC
ATTCAACAGGCCACAGAGACCAGGACTCGGTGAAAATCTTATGATCAG
CATTAACACATGCCTAAATTCAAACCCGGAGGACTCCCTCAAAGGCTTGG
TGGTCCGAGTTGAAAGACTTGGAGTCGGTTCTGACAACATTCTGACCCAAAG
CAGTTTGTCTGGCTTGGACATTACACACAAATGGCATGGAAAGGAAC
TACTGAAATTGGATGTTTGTGGAAATTGTCACATTCACTTATCCGTAT
GCCAAATATGGTCCAGGGAAACTACATGAACCAACTAATCTATACCAAGGG
CTCACCATGCACAGCTGACGCCATTGCCAGGAACCCAGACATGCAGTGTGTC
GCTGAAGCATTGTGTTATCCCTTAGTAAATTCTATGCAACTCTTTGAAA
GTCATAATAATGCAAATAAAAATTAAAAAA

To Fig. 1-3



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FIG. 1-3

FROM Fig.1-2

VAP-2 amino acid sequence (SEQ ID NO:3)

MNVVLSAVTFLFLIFRYAQTVNIEGSGGNDELLEQNvwNDVDDKVVEALGGDD
 ELLTEHVCNKSTITQLQQEITLTTHNELRRSLAEGKQRNKRGLIiNGARNMYKLD
 WDCELASLAANWSTSSCPQHFMPSQVLSNAQLFKRKYFYFDGHHDSTVHMRNA
 MKYWWWQQGEEKGKGNEDQKNRFYARRNYFGWANMAKGKTYRVGCSYIMCGDG
 ESALFTCLYNEKAQCEKEMIYENGKPCCEDKDCFTYPGSKCLVPEGLCQAPSVM
 KDDGGSFQCDNSLVSVDVTRNFTLEQHNFYRSRRLAKGFEWNGETNTSQPKASQM
 IKMEYDCMMLERFAQNWANNCVFAHSAHYERPNQGQNLYMSSFSNPDRSLIHT
 AVEKWWQEELEEFGTPIDNVLTPELWDLKGKAIGHYTQMAWDRTYRLGGCIANC
 PKMSYYVVCYHGPAGNRKNNKIYEIGDPCEVDDDCPIGTDCEKTTSLCVISK

vap-2 cDNA nucleotide sequence (SEQ ID NO:4)

ATGAAACGGTGGTCTTTCCGCTGTCACTCTTTCTGATATGCCAG
 ACTGTGAATATAGAAGGCAGTGGAGGAAATGATGAGCTTCTGAGCAACG
 TGTGGAAACGGATGAGACCAAGGTTGTTAGAAGCACTGGGGCTTGATGA
 TGAACCTGCTAACCGAACATGTTGTAACAAATCAACGATCACTCAGCTACAG
 CAGGAGATCATCTGACAACCCACAATGAATTACGAAGATCATGGCTTTCG
 GAAAGCAAAGAACAAAGAGGGCTCATGAACGGTGGAGAAATATGTATA
 AACTGGATTGGGATTGTGAACCTGGCATCACTGGCATTGGTCAACCTCC
 TGCCCTCAGCACTTATGCCGCAATCGGTACTTGGCTCCAACGCTCAGCTTT

To Fig.1-4



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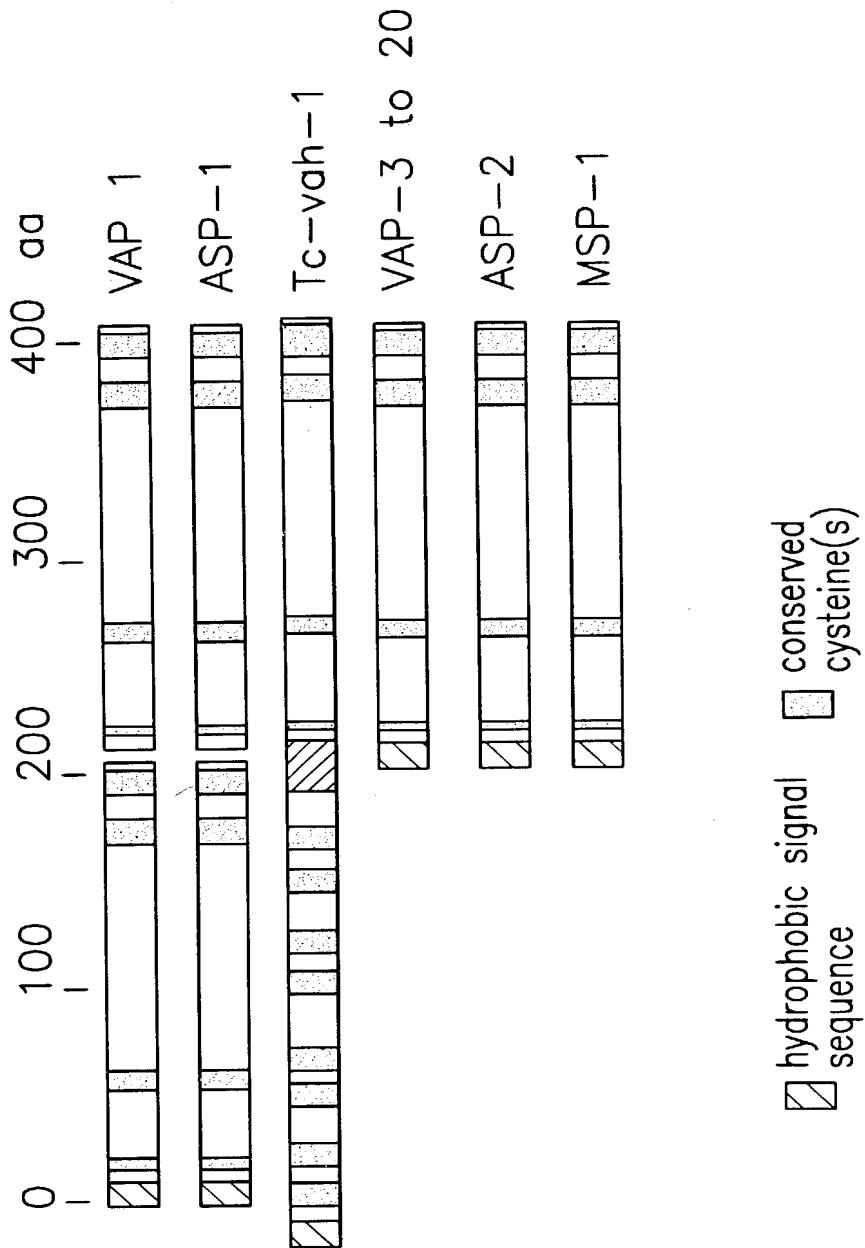
FIG. 1-4

FROM Fig. 1-3

TAAGCGTTCTATTGATGGCACCGACTCTACTGTACATATGCCGAAC
ACGGCATGAAGTTGGCAGCAAGGTGAAGAAAAGGCAATGAGGATC
AGAAAAATAGATTCTATGCCAGACGAAATTATTGGATGGCAAAACATGGC
AAAAGGAAAAACATATCGAGTTGGATGCTCGTATTATGGCGGACGGT
GAATCTGCACCTTCACTTGTCTTATAACGAAAAGCCCAATGGGAAAAG
AAATGATTACGAAAATGGAAAACCCCTGCTGTGAGGATAAAGACTGTTCAC
ATATCCAGGATCAAATGTTAGTACCTGAAGGATTATGTCAGACACCTTCTA
TGGTAAGGATGATGGAGGAAGTTCCAATGTDATAACTCCCTTGTGTCAGA
TGTCAACCCGAATTTCACCTGGAGCAACACAATTTTTATAGATCTGTCCTTG
CAAAGGTTTGAATGGAATGGAGAAACAAACACTTCCAGCCAAGGCTAG
TCAAATGATCAAATGGACTATGACTGCATGTTGGAACGGTTGCACAAAC
TGGCAAAATAATTGGGTTTGGCACACTCGGCACATTACGAAAGACCGAATC
AGGTCAAGAATCTCATGACTCTTCTCAAAACCTGATCCTAGAACGCCCT
ATACATACGGCGTCGAGAAGTGGTGGCAGGAATTGGAGGACTCGGTACTC
CAATTGATAACGTTCTGACACCCGAATTGGGATTGAAAGGGAAAGCGAT
AGGACATTACACTCAGATGCCCTGGATCGTACTTACCGTCTTGGTTGGAA
TCGCAAAACTGTCCGAAGATGTCGTACGTGGTTGTCAGTGGCCAGCAG
CAACAGAAAGAACATAAAATCTATGAAATCCTGGATCCTGGAAAGTCGAT
GATGATTGCCGATTGGAACAGATTGTGAAAGACAACCTTATGTTGAT
CTCAAAATAA

FIG.2

Schematic diagram of nematode venom allergen protein domains



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FIG.3-1

CLUSTAL W Alignment of VAP-1, VAP-2, and selected other nematode VA proteins.

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VAP-1N	1	-----	MAVLAVVLLACLERA[V]AQTFG	22
VAP-1C	1	-----	PQAPV[VET]FTM	11
VAP-2N	1	-----	1MNVVVL SAVT LFL I FRYAQTVNIEGGGNDELLEQNVWNDVDDKVV EALGGDDDELTEHV	60
VAP-2C	1	-----	SFQ	3
ASP-1N	1	-----	MFS PVIVSVI FTTI AFC DAS PARDGFG	26
ASP-1C	1	-----	DVP ET NQQ	8
VAP-3	1	-----	MNY LLL VVALAVG	13
MSP-1	1	-----	MSNKLIISIL LTI	14

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VAP-1N	23	CSNTKIN--	DQARK[KMFYDAHNDARRSMAKGL[EPN--	76
VAP-1C	12	CPSVT-DQS	DQARQNFDT[HNKLRTSLAKGLEADGIAAGAFAPMAKQMPKLVKY	70
VAP-2N	61	CNKST--	QKQRN---KRG[LMNGARNMYKLD-WDCELAS	114
VAP-2N	4	CDNSLV--	SDVTRNFTL[EQHNFYRSRLAKGFEWNG-ETNTSQPKASQMIKME-YDCMLER	59
ASP-1N	27	CSNSG--	TDKDRQAFLDFHNNARRVAKGV[EDS---NSGKLNP[AKNMYSWDCAMEQ	80
ASP-1C	9	CPSNT-GMT	DSVRDTFLSVHNEFRSSV[ARGLEPD--ALGCNAPKAAKMLKMV-YDCVEA	64
VAP-3	14	CSADFG--	SSGQNG[INAHNTLRSKIAKGTYVA---KGTQKSPGTNLLKMK-WD[SAVAA	66
MSP-1	15	1YT[VVNSLT	VPEQNAV[VD[CIKYRSQ[ANGKTKN--KNGGNFPSGKDILEVS-YSKDLEK	71

To Fig.3-2

FIG. 3-2

FROM Fig. 3-1

VAP-1N	77 KAQEWA[DGC]PSSFQT--FDPT---WGQNYATYMGSI--ADPLPYASMA[VNGWWSE]IRTVG	129
VAP-1C	71 NARTWA[KGCL]YQHS[TSAQRPG]---LGENLYMISINN--MPKIQTAEDSSKAWWSELKDFG	125
VAP-2N	115 LAA[NWST]SCPQHFMPQSVLGS---NAQLFKRFYFYFDGH[HDSTVHMRNA]MKYWWQQGEEKG	171
VAP-2C	60 FAQ[NWANNCVFA]SAHYERPN---QGQNLYMSSFSN--PDPRSLIHTAVEKWWQELE[EEFG]	114
ASP-1N	81 QLQDAIQSCPSAFA[G]---I[QG]---VAQNVMWSWSSSGFPDPSVKEQTL[SGWWSGA]KKNG	134
ASP-1C	65 SAIRHGN[KCVYQH]SHGEDRPG---LGENI[YKTSVLK--FDKNAAKQA]SQLWWN[ELKEFG	119
VAP-3	67 SAQNYANGCPTGH[SG]---DAG---LGENLYWYWTSGSL[DLNQYGSAASASWEKEFQDYC	120
MSP-1	72 SAQRWANKCIFDHNGTDLYSGGKFYGENLYLDGDFEH-KNITQLMIDACNAWWGE[STTDG	130

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VAP-1N	130 LTD---PDNK---YTNSA---MFRFANMANGKASAF[GAYAL]CAGKL---S[INCI]172	
VAP-1C	126 VGSD---[N]LTQA---VFDRG---V[GHYTQMAWE]GTT[E]GCFVENCPTFT---YSV[Q]171	
VAP-2N	172 NEDQ---KNR---FYARRN--YF[GWANMA]KGKTYRVGCSYIMCGDGE[ES]---ALFTCL217	
VAP-2C	115 TPID---NV[LTPE]---LWDLKGKAI[GHYTQMAWDR]TYRLGCCIANCPKMS---YVYCH163	
ASP-1N	135 VGPD---N---KYNGG---LFAFSNMVYSET[KLGCAYKVCGTKL---AVSC]176	
ASP-1C	120 VGPS---NV[TTA]---LWNRPGMQI[GHYTQMAWDTTYKLGCAYVFCNDFT---FGV[Q]168	
VAP-3	121 WKS---NLMTID---LFNTG---GHATQMAWA[KSNL]IGCGV[KDGRDSNGLNKVTVV]CQ171	
MSP-1	131 VPPSWINNFLPTDNKENDEKFEAV[GHW]TQMAWA[KTYQIGCAL]KVCH[KPDCNGN--LIDCR188	

To Fig. 3-3



FIG. 3-3

FROM Fig.3-2

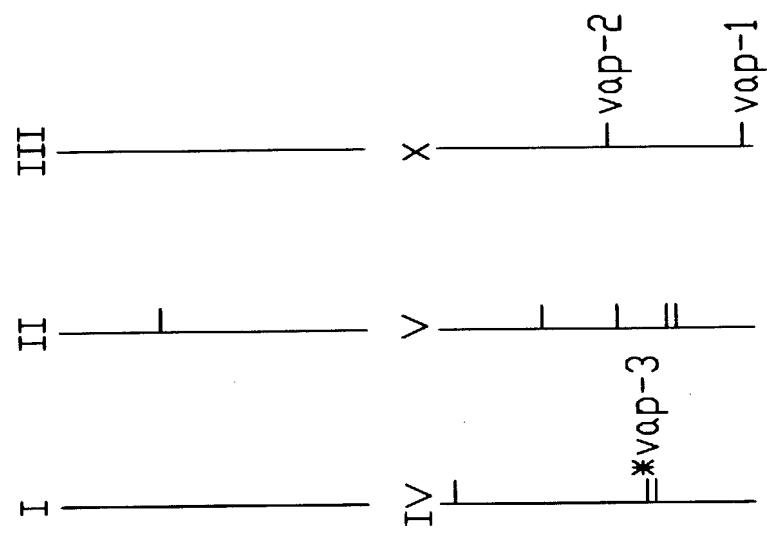
173 YN KI GYMT NA I Y E KG DACT SDAE CTTYS -- DS QCK NGL CY KA ----- 213
 172 YGPAG NY MN QL I Y T KG SP CT AD AD CP GT Q -- T CS VAE AL C - V -- IP ----- 212
 218 YNE KA QCE KE M I Y E NG KP CC ED KD CFT Y PG SK CL V P E GL C QAP SMV KDD GG 268
 164 YGPAG NR KN NK I Y E I GD PC E V D D C P I GT -- DCE KT T S L C - V -- IS K ----- 205
 177 YNG V GY I T N Q P M W E T G Q A C K T G A D C S T Y K -- NS G C E D G L C T K G P ----- 218
 169 YGP G GN YM GH V I Y T M G Q P C S -- Q C S P G A -- T C S Y T E G L C - S -- A -- P -- 206
 172 YKP Q G N F I N Q Y I Y V S G A T C S -- G C P S G T -- S C E T S T G L C V ----- 207
 189 YY P G G N G M G S P I Y Q Q G K P A S -- G C G K A G -- P S T K Y S G L C K P D P H Q N N -- 231

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FIG. 4

Schematic map of selected *C. elegans* *vap* genes



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FIG. 5A

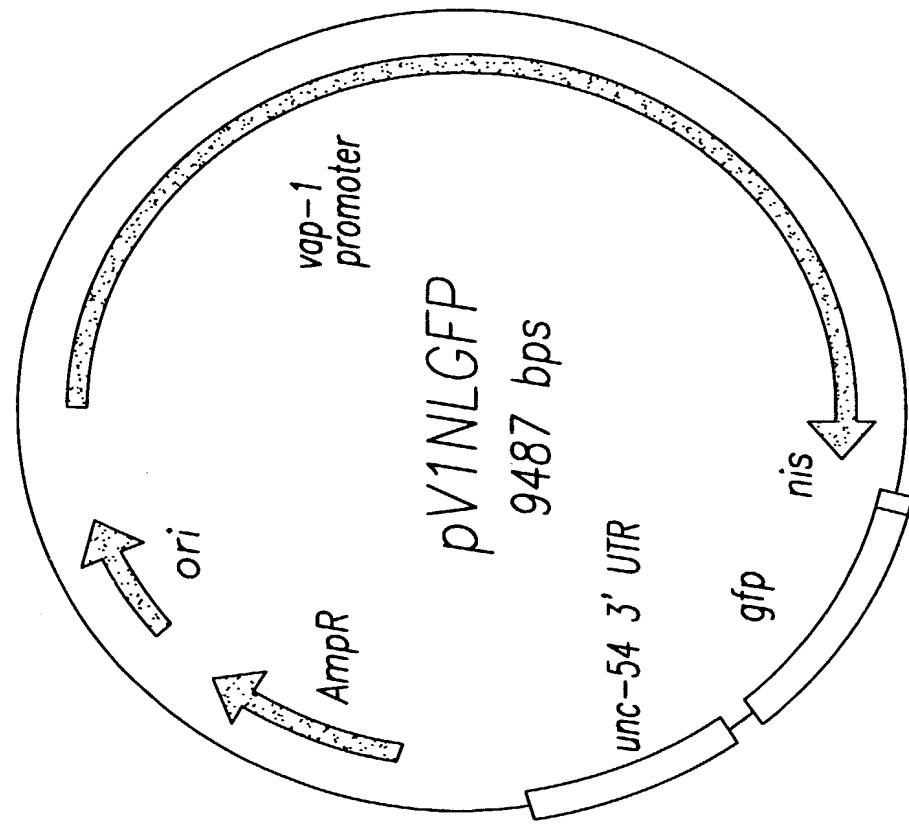
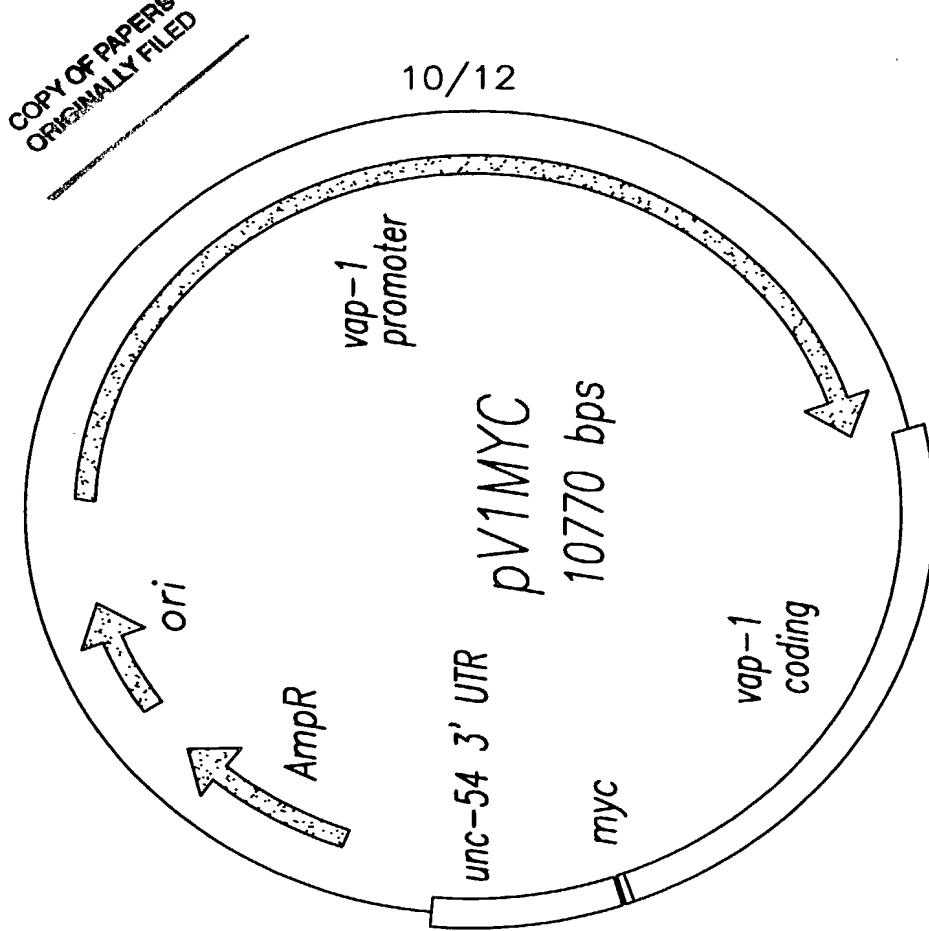


FIG. 5B





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FIG. 6A

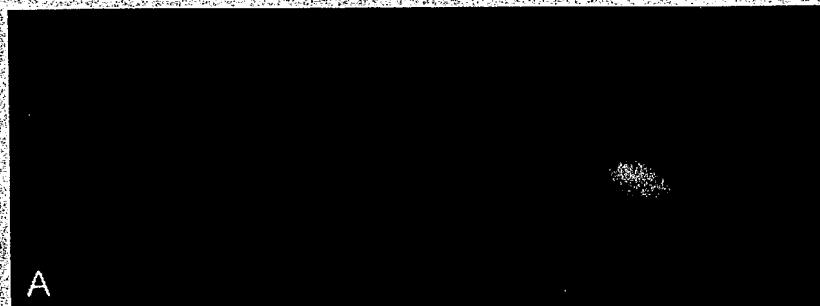


FIG. 6B

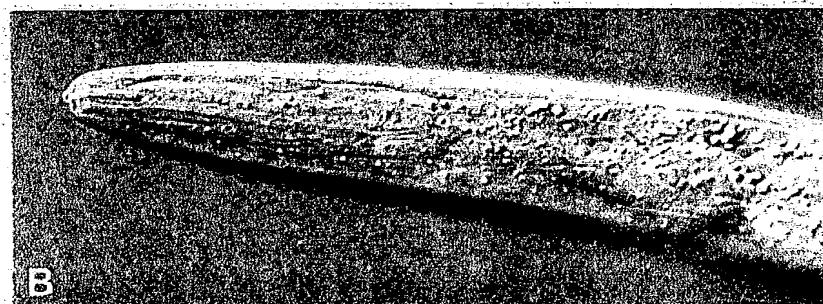


FIG. 6C





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FIG. 7

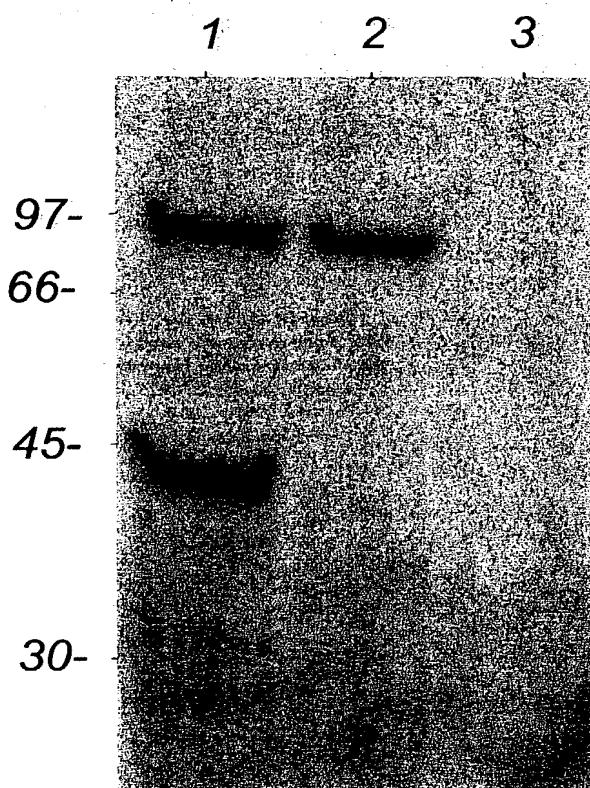


FIG. 8

